

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
Response to Office action mailed Jul. 26, 2005
Response filed October 24, 2005

Claim Listing

1. (currently amended) Apparatus for coating a traveling paper web with a film of coating, the apparatus operatively associated with an adjacent backing roll and comprising, in combination:
 - a coater head having an inlet for receiving a supply of fresh coating, the inlet having a first cross section;
 - a mixing chamber in the coater head in fluid communication with the inlet for receiving the supply of fresh coating, the mixing chamber having a second cross section larger than the first cross section so that a flow of coating moving from the inlet to the mixing chamber diverges;
 - a feed channel in the coater head, wherein the feed channel is in fluid communication with the mixing chamber for receiving coating from the mixing chamber, and wherein the feed channel is separate and distinct from the mixing chamber, and wherein the feed channel has a third cross section which is smaller than the second cross section so that a flow of coating moving from the mixing chamber to the feed channel converges;
 - a baffle mounted in the apparatus and operatively associated with the feed channel and having an edge disposed in spaced adjacency with the surface of the backing roll, and substantially parallel to the feed channel ~~thereto~~, so as to form an overflow gap with either the paper web surface to be coated, when the web is supported on the backing roll surface, or the backing roll surface, when the paper web is not supported on the backing roll surface, and to provide for the escape of coating therethrough when coating is flowed through the feed channel;
 - a coating chamber in the coater head in fluid communication with the feed channel, and so constructed and arranged as to be open toward the backing roll for applying a

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film of coating to either the paper web surface to be coated, when the web is supported on the backing roll surface, or on the backing roll surface, when the paper web is not supported on the backing roll surface; [[and]]

recirculation means in the coater head, and in fluid communication with the coating chamber and the mixing chamber for returning coating from the coating chamber to the mixing chamber to be combined with the fresh coating, and to establish, together with the feed channel, a continuous flow loop for circulation of coating within the coater head, the recirculation means including a plurality of flow-metering orifices linking a channel with the mixing chamber, said orifices being so constructed and arranged as to form an acute angle with the inlet; and

wherein a flexible blade is mounted in the coater head to define, with the surfaces of the backing roll, the coating chamber, the flexible blade extending downstream of the coating chamber in the apparatus, the blade having a blade surface and a proximate end mounted in the coater head and a distal end extending downstream such that a portion of the blade surface which extends to the distal end is substantially tangent to the backing roll.

2. (canceled)

3. (previously presented) The apparatus for coating a traveling paper web of claim 1, wherein:

the coater head includes a stabilizer surface for defining a part of the coating chamber for assisting in the flow of coating downstream and against either the surface of the paper web to be coated or on the surface of the backing roll.

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4. (currently amended) Apparatus for coating a traveling paper web with a film of coating, the apparatus operatively associated with an adjacent backing roll and comprising, in combination:

- a coater head having an inlet for receiving a supply of fresh coating;
- a mixing chamber in the coater head in fluid communication with the inlet for receiving the supply of fresh coating;
- a feed channel in the coater head in fluid communication with the mixing chamber for receiving coating from the mixing chamber;
- a baffle mounted in the apparatus and operatively associated with the feed channel and having an edge disposed in spaced adjacency with the surface of the backing roll, and substantially parallel thereto, so as to form an overflow gap with either the paper web surface to be coated, when the web is supported on the backing roll surface, or the backing roll surface, when the paper web is not supported on the backing roll surface, and to provide for the escape of coating therethrough when coating is flowed through the feed channel;
- a coating chamber in the coater head in fluid communication with the feed channel, and so constructed and arranged as to be open toward the backing roll for applying a film of coating to either the paper web surface to be coated, when the web is supported on the backing roll surface, or on the backing roll surface, when the paper web is not supported on the backing roll surface;
- recirculation means in the coater head, and in fluid communication with the coating chamber and the mixing chamber for returning coating from the coating chamber to the mixing chamber to be combined with the fresh coating, and to establish, together with the feed channel, a continuous flow loop for circulation of coating within the coater head;

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the recirculation means including a plurality of flow-metering orifices linking a channel with the mixing chamber, said orifices being so constructed and arranged as to form an acute angle with the inlet; and
a flexible blade mounted [[in]] to a surface of the coater head at a proximal end so that the flexible blade is only supported at the proximal end and having a distal end extending downstream therein, and defining, with the surface of the backing roll, the coating chamber on one surface of the blade, and defining, with the coater head, a recirculation channel on the other surface of the blade.

5-7. (canceled)

8. (previously presented) The apparatus for coating a traveling paper web of claim 1, further comprising:

a metering rod holder mounted in the apparatus for holding a rotatable metering rod for nipping engagement with either the coated paper web or the surface of the associated backing roll downstream of the coating chamber; and
a metering rod rotatably mounted in the metering rod holder.

9. (previously presented) The apparatus for coating a traveling paper web of claim 8, further comprising:

drive means operatively connected to the metering rod for rotating the metering rod while the metering rod is in nipping, coating metering engagement with the coating material against either the coated web or the surface of the backing roll.

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10. (currently amended) A method for coating a traveling paper web with a film of coating, the paper web being either supported on the surface of a backing roll rotating in a downstream direction, or nipped against the surface of the backing roll, the method comprising the steps of:

introducing a fresh supply of coating into a mixing chamber of a coater head and
directing the fresh supply of coating into the mixing chamber in the coater head
through a plurality of diverging parallel holes aligned in a cross-machine
direction;
flowing a coating flow from the mixing chamber in a converging flow into, and through,
a feed channel in the coater head;
dividing the coating exiting the feed channel into a first portion constituting a major part
of the flow from the mixing chamber and a second portion constituting a minor
part of the flow from the mixing chamber;
directing the first portion into a coating chamber in the coater head, and directing the
second portion in an upstream direction over a baffle disposed in spaced
adjacency with either the paper web supported on the backing roll, or the surface
of the backing roll, to define a gap therebetween, the second portion being
sufficient to seal the gap from air moving with either the traveling paper web or
the surface of the backing roll;
flowing the coating in the coating chamber in the downstream direction therein while
maintaining a pressurized interface between the coating material and the paper
web, when the paper web is supported on the surface of the backing roll to coat
the paper web, or maintaining a pressurized interface between the coating material
and the surface of the backing roll when the paper web is nipped against the
surface of the backing roll downstream of the interface to coat the paper web;

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flowing the coating from the coating chamber into a recirculation chamber;
directing all the coating from the recirculation chamber into the mixing chamber through a plurality of flow-metering orifices formed in the coater head which are aligned parallel with one another in the cross-machine direction and which connect the recirculation chamber with the mixing chamber, the direction of flow of coating from the recirculation chamber being at an acute angle to the direction of flow of the fresh supply of coating being directed into the mixing chamber; and
mixing the coating from the recirculation chamber with the fresh coating in the mixing chamber.

11. (currently amended) The method of claim 10 further comprising the step of metering the film of coating against the surface of the backing roll or the paper web moving in a first direction, with a metering rod, the metering rod having a rod surface which engages along a contact line the backing roll or paper web on the backing roll, so that the rod surface at the contact line moves in a direction opposite that of the backing roll or the paper web at the contact line counter-rotating relative to the rotation direction of the backing roll.

12. (currently amended) The method of claim 10 further comprising the step of using a flexible blade mounted [[in]] to a surface of the coater head to form the baffle, the flexible blade defining the coating chamber and the recirculation channel.